



## Iran: Crop Progress Report

MY 2010/11

### February Summary

February 26, 2010

- (1) Overall weather and crop conditions during the current MY 2010/11 winter grain season for Iran have been extremely favorable to-date and currently indicate the potential for a near-record or record grain (wheat, barley) harvest. This follows two consecutive years of drought, where wheat production dropped 20-35 percent and led to near-record or record grain imports. Particularly good signs of crop development are evident in two major irrigated production provinces in southwestern Iran (Fars and Khuzestan), which are collectively responsible for 25% of national wheat production and 10% of the total barley crop. In these normally arid producing regions, well-above normal rainfall this year has helped to replenish reservoir levels and spur a significant increase in planted grain area. Satellite imagery also indicates that the country's major northwestern rainfed grain growing regions achieved a normal planted acreage, with ample rainfall and mild winter temperatures spurring crop development in recent weeks. Important northeastern provinces such as Razavi Khorasan and Golestan, which normally account for 21% of national wheat production and 10% of the total barley crop, also appear to be developing normally.
- (2) Season-to-date precipitation over Iran's major winter grain producing regions has been very beneficial, with significantly higher than normal rainfall occurring over the primarily rainfed provinces in the northwest as well as over two major provinces in the southwest (Figure 1). Rainfall was particularly heavy during November and December, and then was almost non-existent during January. Winter grain crops were either dormant or growing very slowly in January and thus are not expected to have experienced any ill affects. Early February brought a return of widespread showers (normal to above normal rainfall) just as crops were beginning to break dormancy and enter early vegetative growth (Figure 2). In addition to the above normal rainfall pattern this year, Iran has also experienced unseasonably warm temperatures across most of the country (Figure 3). The abnormally warm winter has significantly reduced the winter snowpack and caused earlier than normal crop vegetative development. Whether or not the current lack of snow or advanced crop development could negatively affect grain production prospects will only become clear in future months. At present, both irrigated and rainfed crop prospects are excellent. If, however, predominantly dry and hot springtime conditions prevail from March-June, the outlook for national grain production would not be as favorable.
- (3) Satellite-derived vegetation index (NDVI) data analysis comparing current crop conditions against the 6-year average show that most of the cropland in northwestern Iran has benefited from the ideal early rainfall and has better vegetative development than normal (Figure 8). Winter grain production in this region was near-normal last year, and it appears this years crop will be as good or better. The major factor affecting last year's MY 2009/10 national wheat crop was extremely low production in the primarily irrigated provinces of Fars and Khuzestan (25% of national wheat and 10% of barley) which sustained two years of drought and severely reduced groundwater supplies. The unusually beneficial rainfall during the

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current growing season has revived winter grain production prospects in both provinces. By late February satellite imagery has revealed both increased winter grain area and vegetative vigor. Figures 9 – 13 show the NDVI comparison of current vegetative grain conditions against the previous growing season (MY 2009/10) which included drought-related reductions in wheat and barley production over some important crop areas. The current NDVI evidence shows positive trends across almost all major grains areas in Iran, with particularly large increases evident in Fars and Khuzestan provinces. Some negative trends, showing slightly worse conditions than last year, are evident in Razavi Khorasan which produces roughly 20% of Iran's national barley crop and 8% of the total wheat crop. Major decreases in NDVI over grains areas are also evident in Golestan province, where planted area appears below normal in the central portion of the province. High resolution imagery earlier in the season indicated increases in both area and crop vigor in western Golestan near the Caspian Sea. These divergent situations may prove offsetting when it comes to overall grain production prospects in that Province.

- (4) A multi-source evaluation of crop development in the primarily rainfed northwest region using medium resolution satellite imagery and vegetative index data (NDVI) indicates that current higher than normal NDVI values are related to advanced (earlier than normal) crop growth. It is estimated that the current MY 2010/11 winter grain crop in this region is as much as one month ahead of normal development (Figures 14 and 15). The advanced growth cycle, or shortened winter dormancy, is most likely the result of the unusually low winter snow pack and the prevalence of higher than normal temperatures since mid-December. Grain crops are at potential risk of frost damage throughout the region should a cold snap occur, however a longer than normal growing season may also prove highly beneficial to crop yields should unseasonably warm conditions continue. Provinces in the northwest region of Iran historically account for 28% of national winter grain production, and generally reach peak vegetative development (NDVI) by mid-May. Grain crops in this region typically break dormancy in early March (Figure 4).
- (5) A sustained two-year drought in the major irrigated grains production provinces of Khuzestan and Fars resulted in a significantly reduced wheat crop in MY 2009/10 (estimated at 43% below normal production in those provinces). Groundwater is the primary source of irrigation for agricultural purposes in Iran, with some major rivers also providing surface water as a secondary source of irrigation. A few of Iran's major rivers such as the Karun, Karkeh and Dez flow through Khuzestan province and its agricultural areas. Minimal rainfall during 2008 and 2009 caused a serious decline in both groundwater and reservoir supplies, hindering the amount of grain production that could be sustained. The high rainfall conditions experienced this year have begun to reverse the affects of drought in these important grain producing areas, with satellite imagery showing a significant increase in planted grains area (Figure 16) and reservoir levels (Figure 17). Irrigated agriculture accounts for nearly 70% of wheat production and 65% of barley production nation-wide, implying that the replenishment of Iran's water supplies is integral to raising production prospects in general.
- (6) Monitoring winter snow pack conditions is important to winter grain crop assessments in Iran because snow cover has two important roles. First, and most importantly, snow accumulation provides an important source of ground water for crop growth and aquifer recharge during spring snow melt. Secondly snow over grain fields helps to cover and protect emerged grain seedlings from extreme low temperatures during the coldest months of the winter dormancy

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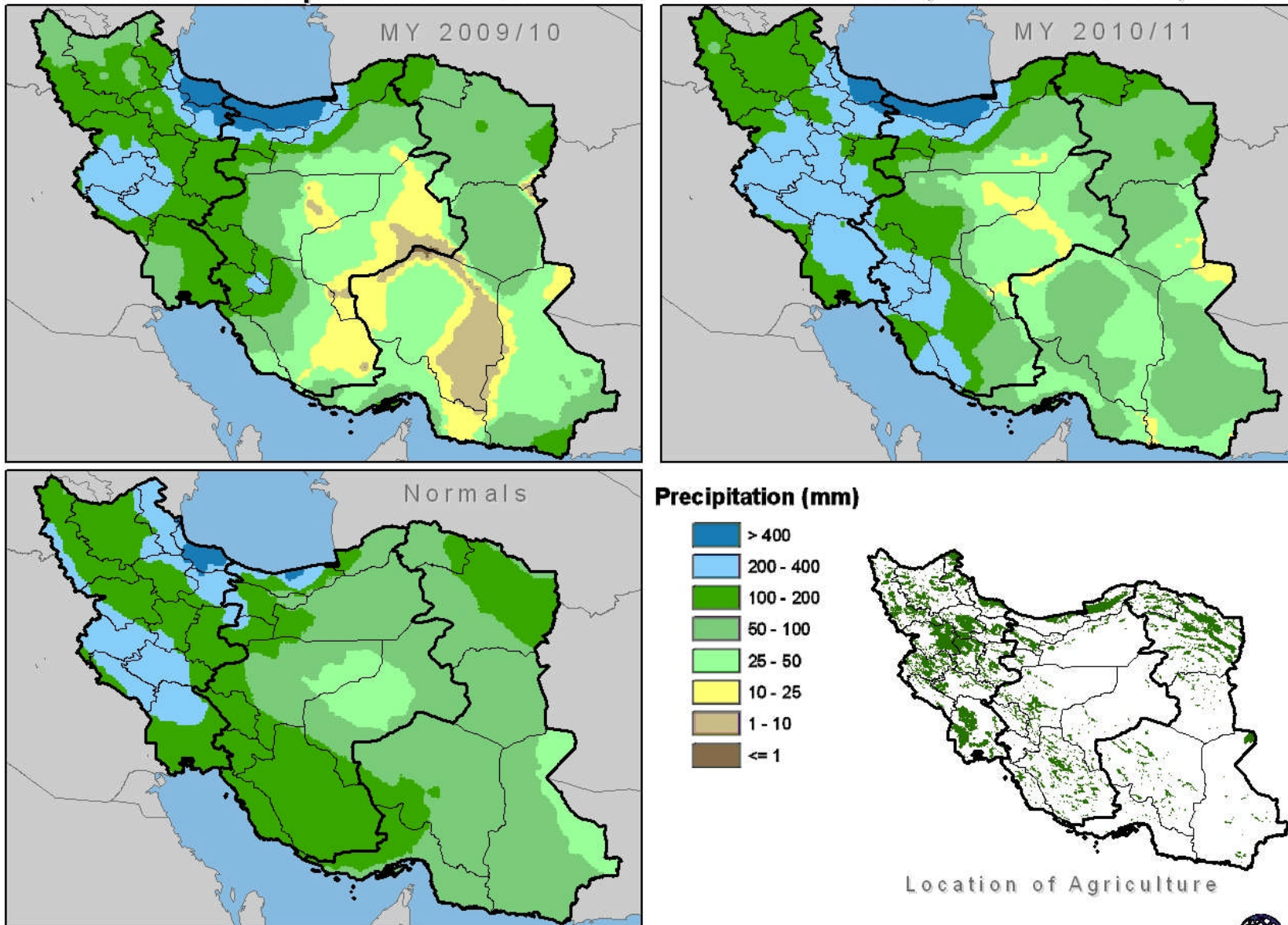
period. Snow cover and snow depth in Iran as of mid-February 2010 was well-below normal in both areal coverage and depth (Figure 18), though the current area is similar to last year. December and January are typically the coldest months in Iran, where snow pack reaches its maximum. The current winter season, however, has been typified by unusually high temperatures and low snow accumulation. Lower than normal snow pack during MY 2010/11 may not be directly affecting winter grain production prospects, however it does indicate that lower reservoir and groundwater regeneration is likely occurring.

- (7) The NOAA Climate Prediction Center 7-day rainfall forecast indicates that continued favorable showers are expected in most primary winter grain producing areas, including the northwest, southwest, and northeast regions (Figure 19).

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**Cumulative Precipitation: Grains Season to date Oct. 1, 2009 - Feb. 20, 2010**





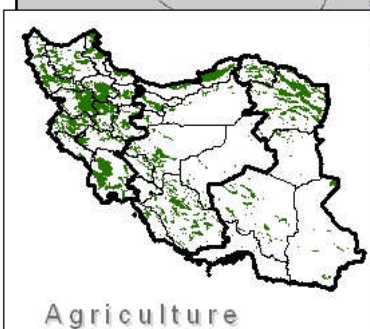
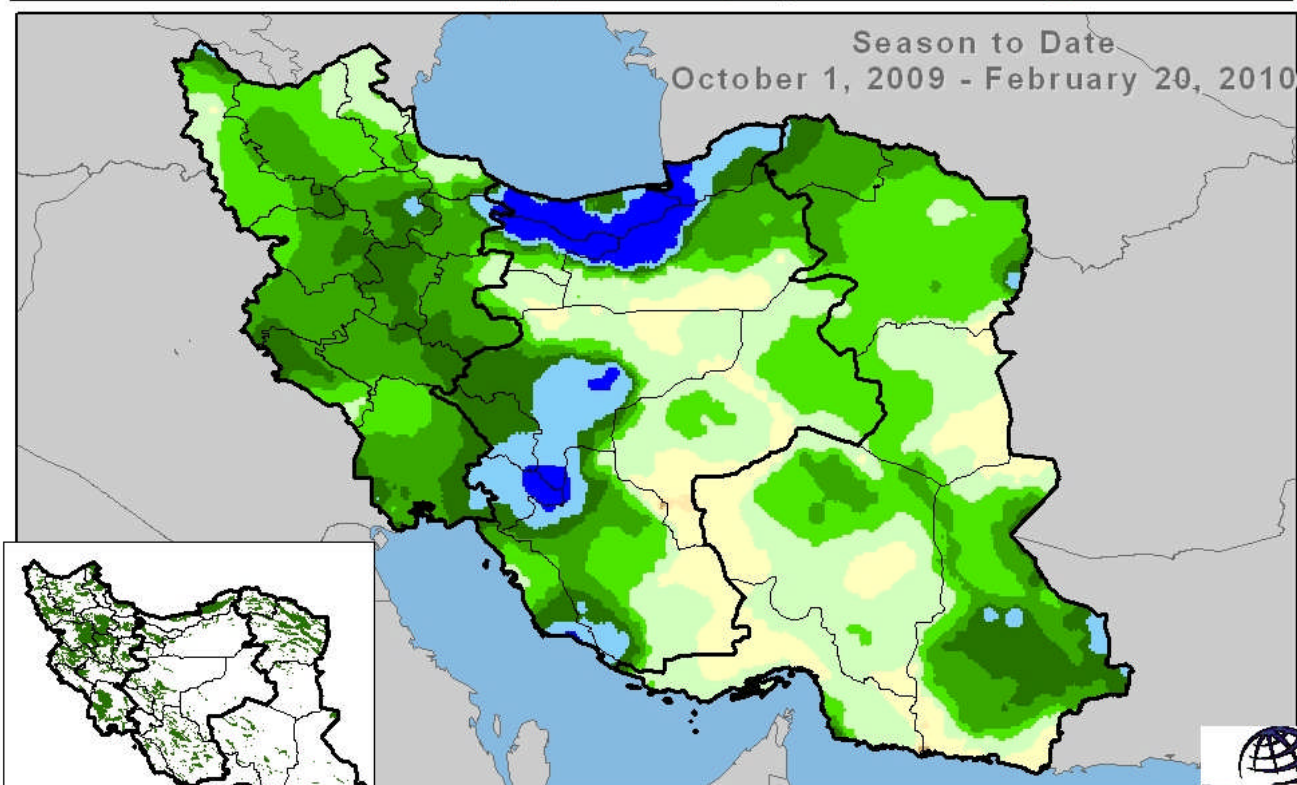
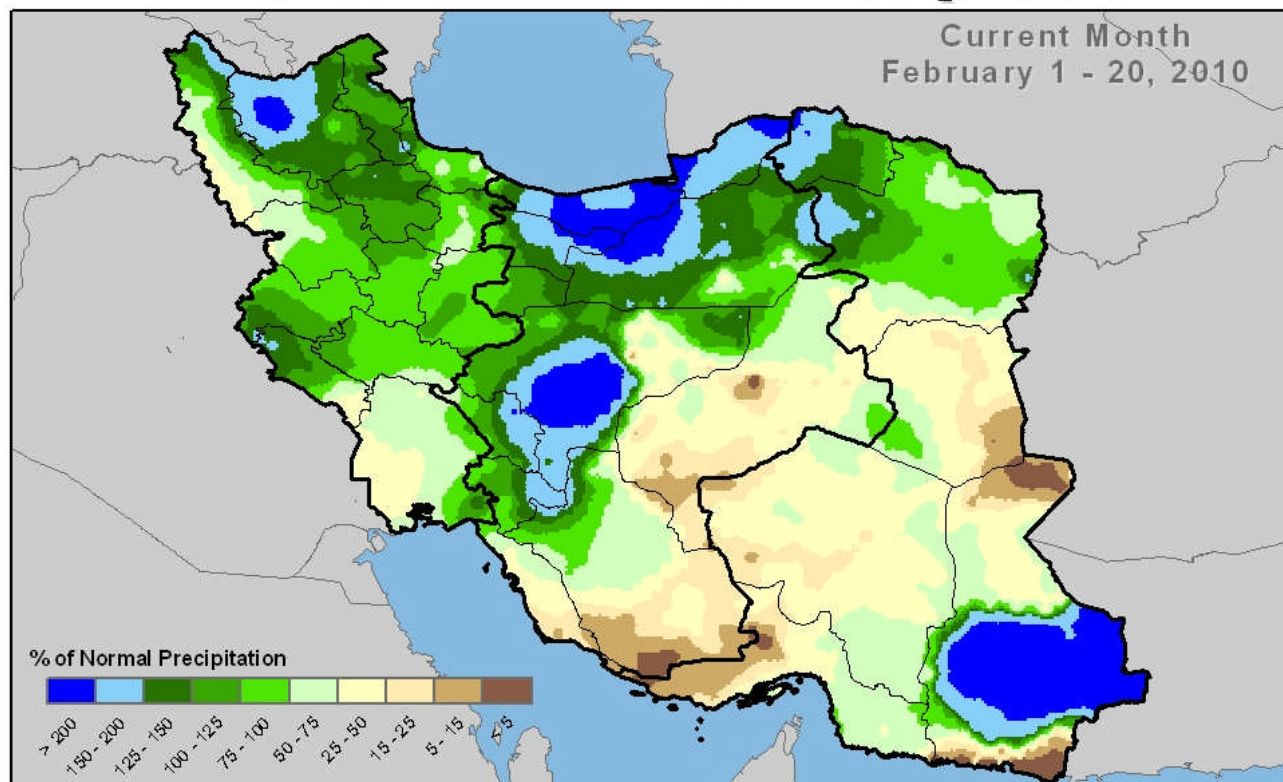
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Figure 1. Season to date cumulative precipitation showing current year (MY 2010/11) compared against the previous years and precipitation normals.

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## Percent of Normal Precipitation



Data Source: USDA-FAS  
Office of Global Analysis- IPAD  
Crop Explorer



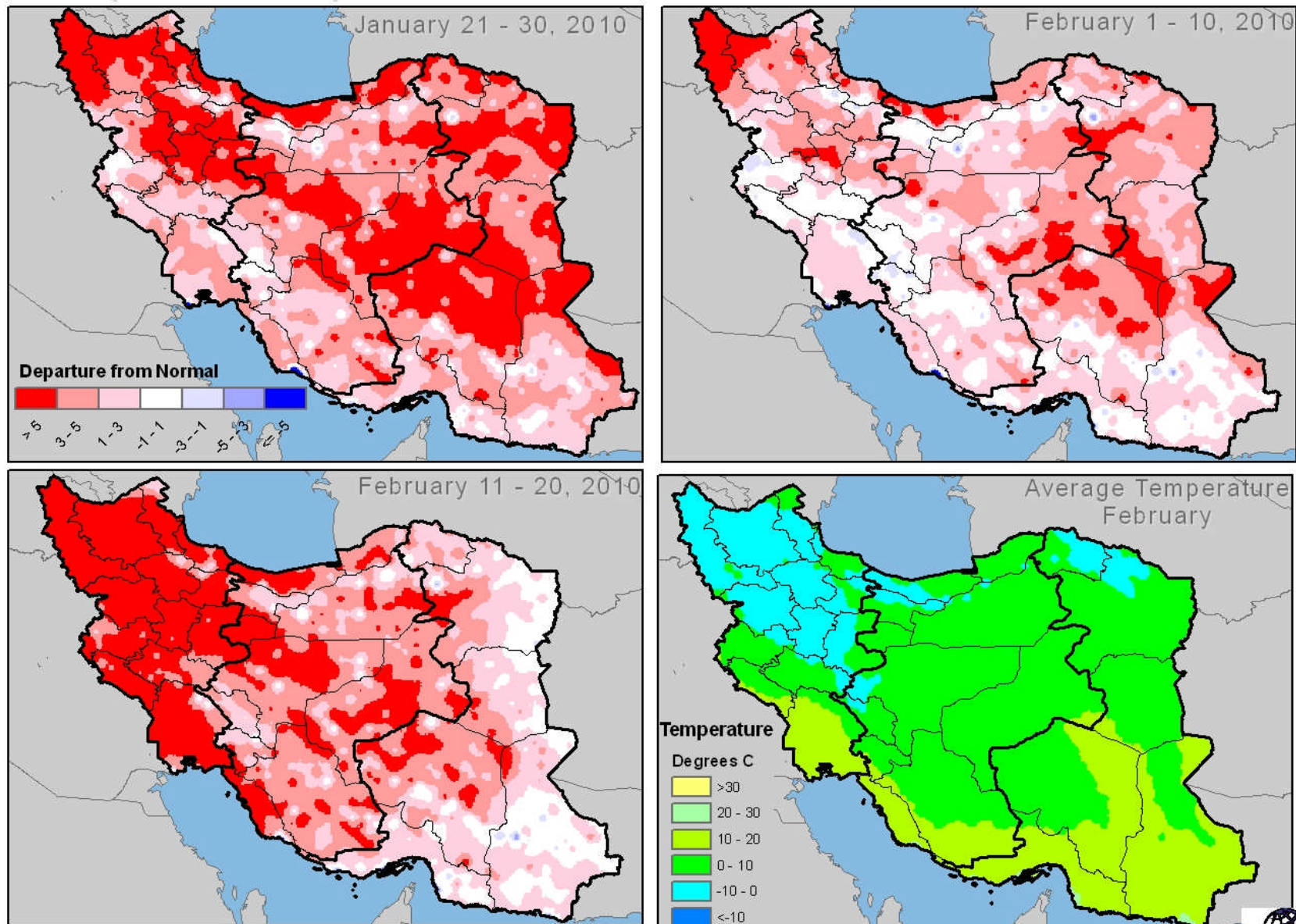
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Figure 2. Percent of normal precipitation showing the current month and winter grains season to date.

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Temperature Departure from Normal: Jan. 21, 2010 - Feb. 20, 2010





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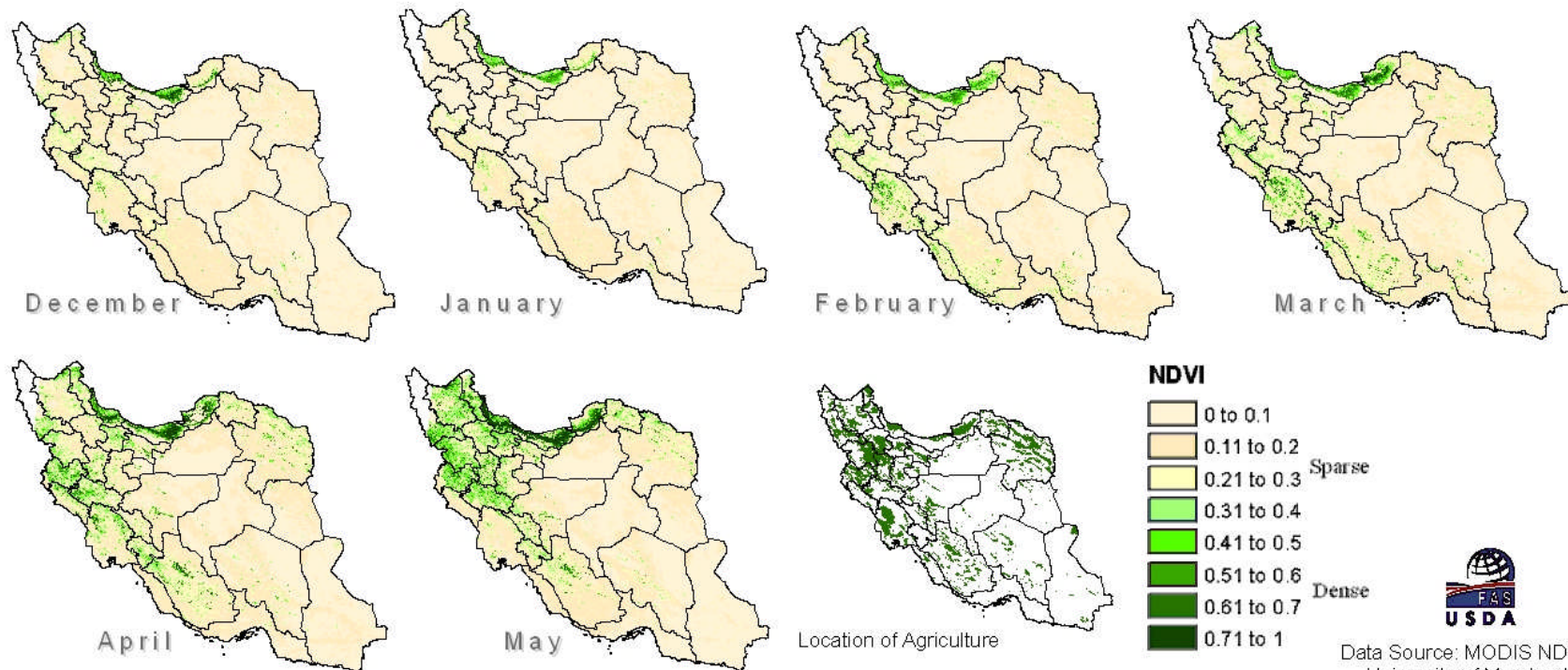
Figure 3. Decadal temperature departure from normal from January 21, 2010 to February 20, 2010.

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## MODIS NDVI Time Series: MY 2010/11 vs. MY 2006/07 Benchmark

### MY 2006/07 - BENCHMARK



### MY 2010/11 - CURRENT



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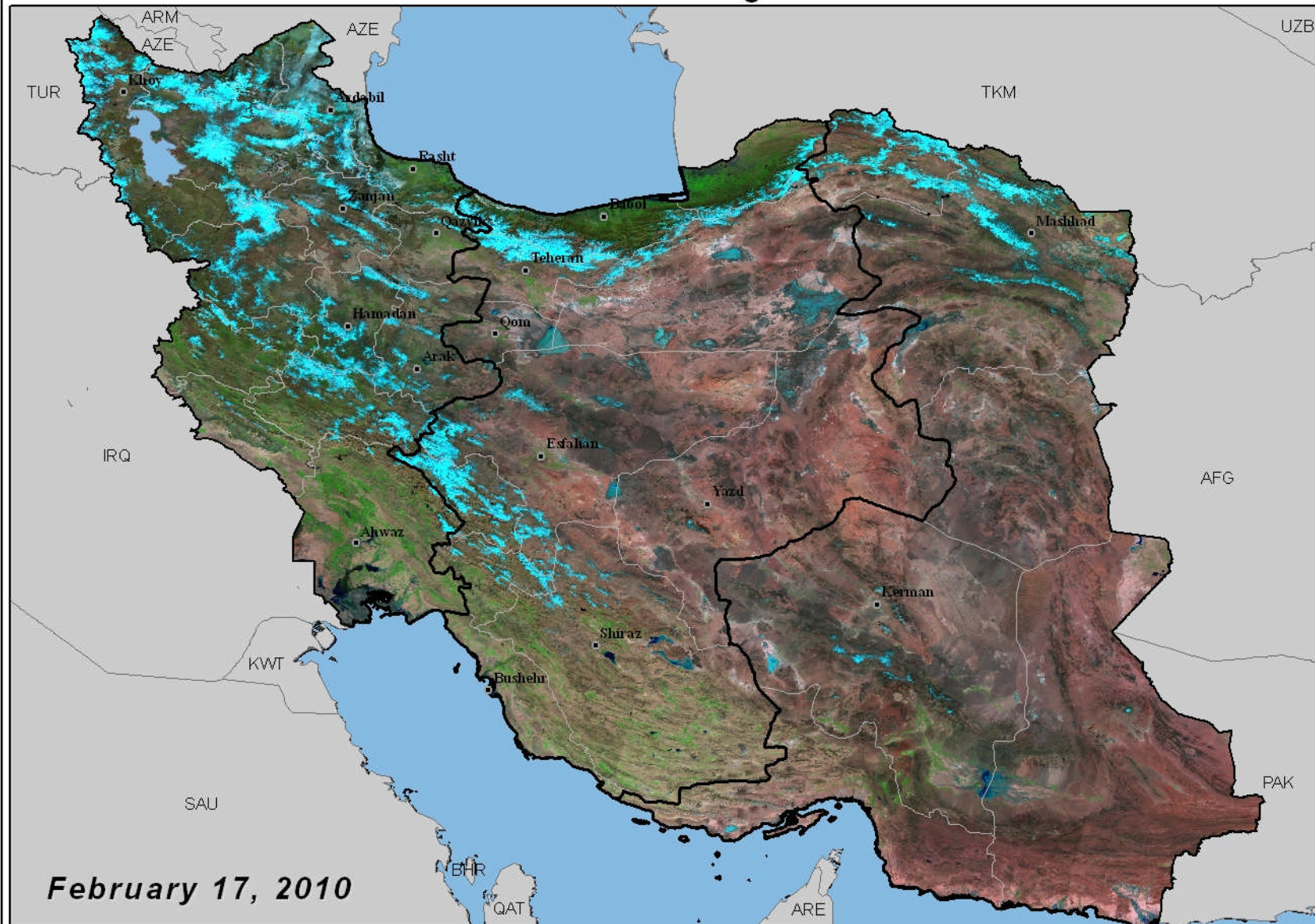
Figure 4. MODIS NDVI images over the winter grains season comparing MY 2006/07 benchmark grain production year to the current season.

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MODIS 721 False-Color Image: MY 2010/11



**February 17, 2010**

Data Source: MODIS 8-Day 721 Composite  
Data Provided by USGS EROS Data Center/ NASA Goddard  
Supporting: USDA/FAS/OGA/IPAD



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Figure 5. MODIS false color, cloud free composite over Iran for the current month, February 10 - 17, 2010.

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## MODIS 721 False-Color Image: MY 2010/11



Data Source: MODIS 8-Day 721 Composite  
Data Provided by USGS EROS Data Center/ NASA Goddard  
Supporting: USDA/FAS/OGA/IPAD

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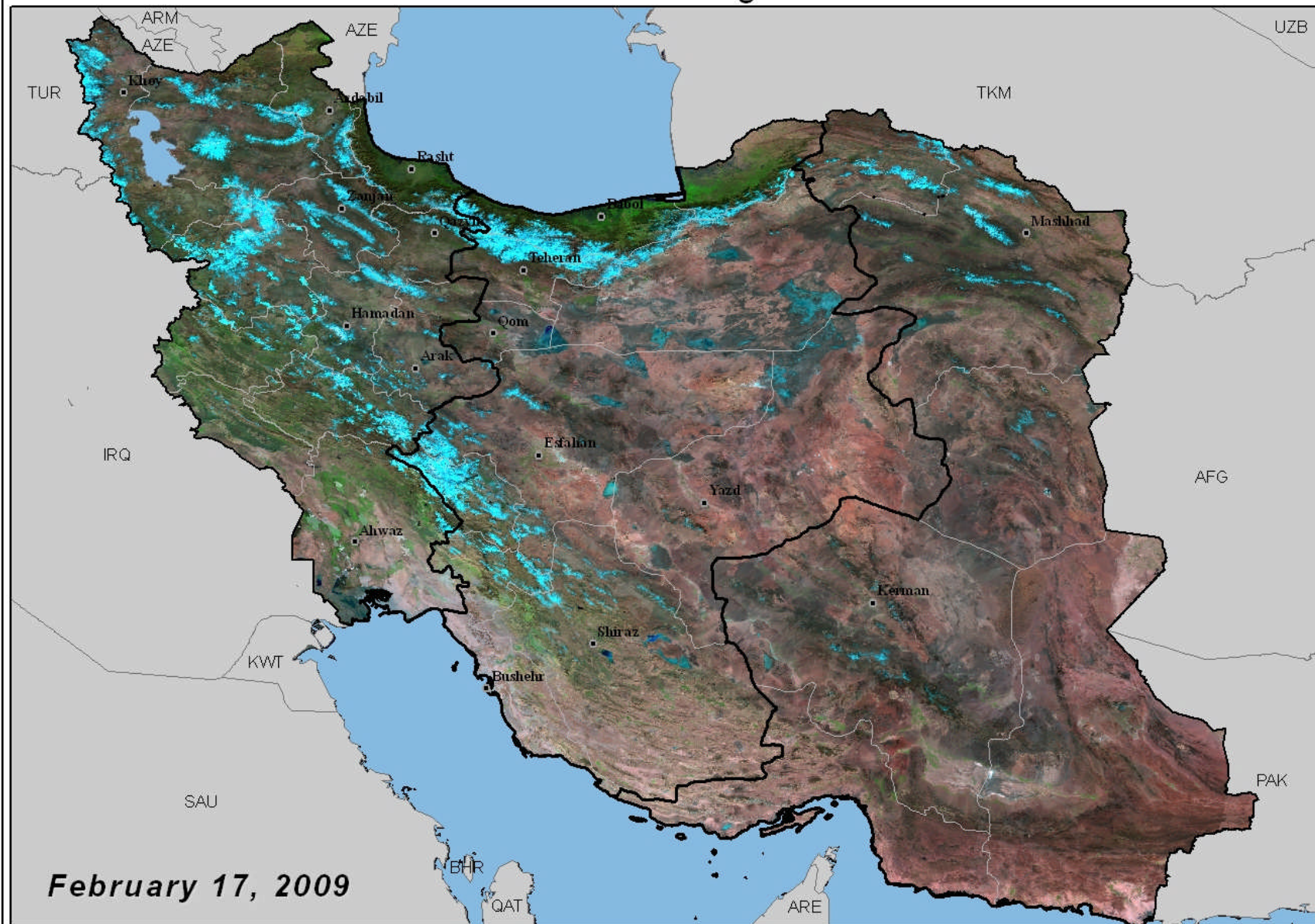
Figure 6. MODIS false color, cloud free composite over Iran for the previous month, January 9 - 16, 2010.

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MODIS 721 False-Color Image: MY 2009/10



**February 17, 2009**

Data Source: MODIS 8-Day 721 Composite  
Data Provided by USGS EROS Data Center/ NASA Goddard  
Supporting: USDA/FAS/OGA/IPAD



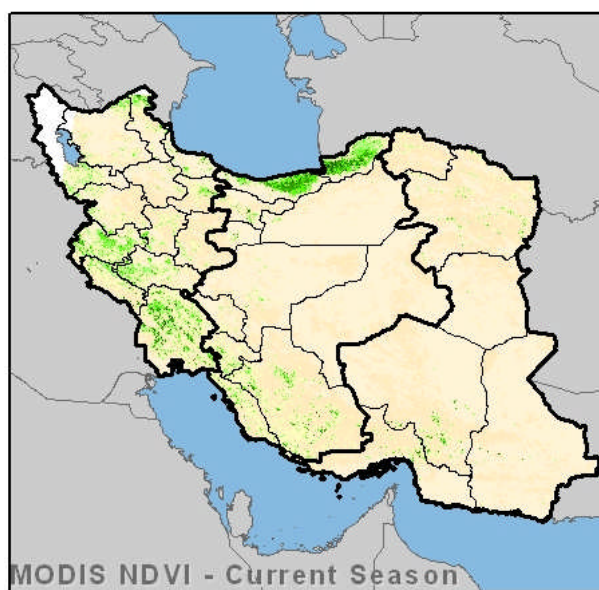
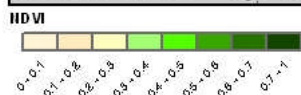
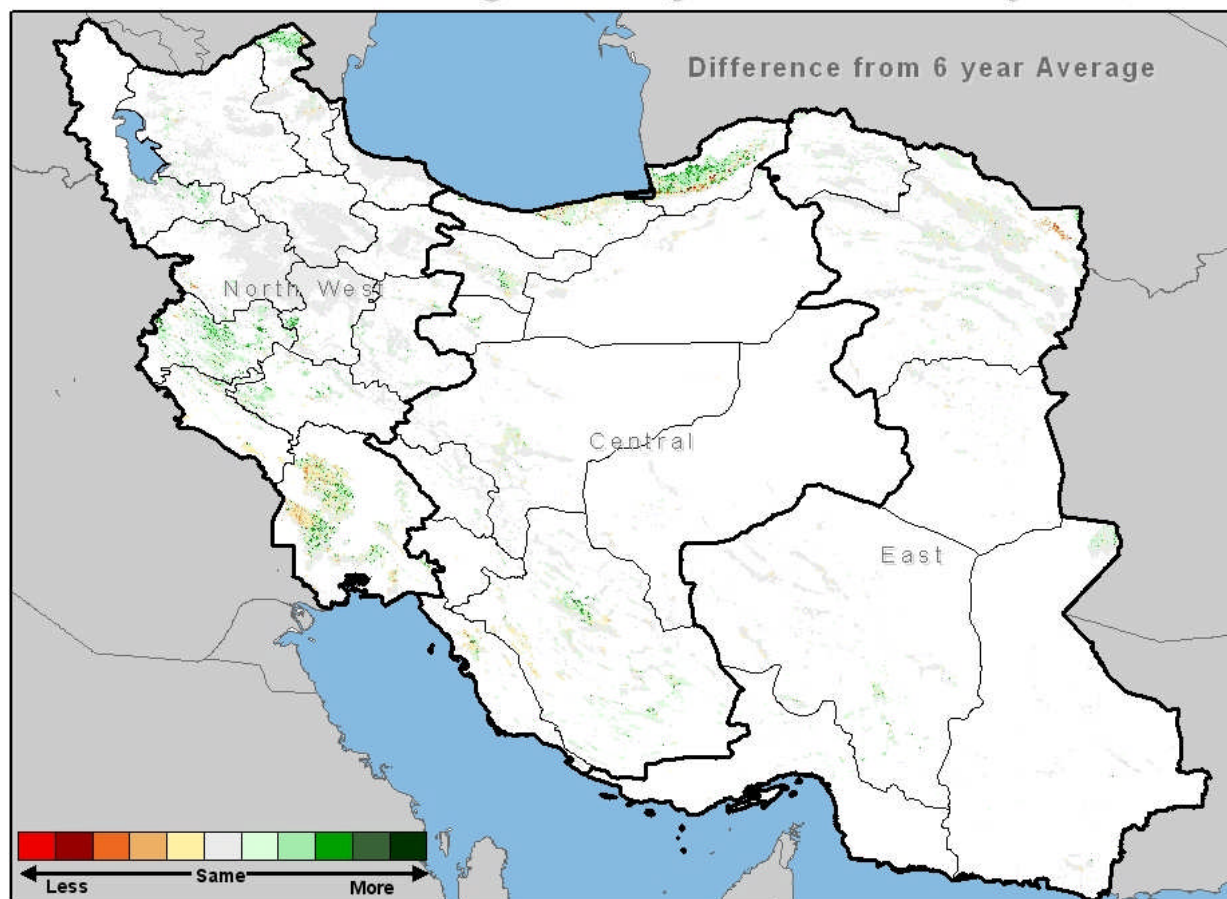
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Figure 7. MODIS false color, cloud free composite over Iran for the current month, last year, February 10 - 17, 2009.

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## MODIS NDVI Change Analysis: February 17, 2010



Data Source: MODIS NDVI 250-m, University of Maryland  
USDA-FAS, Office of Global Analysis, IPAD  
Crop Explorer



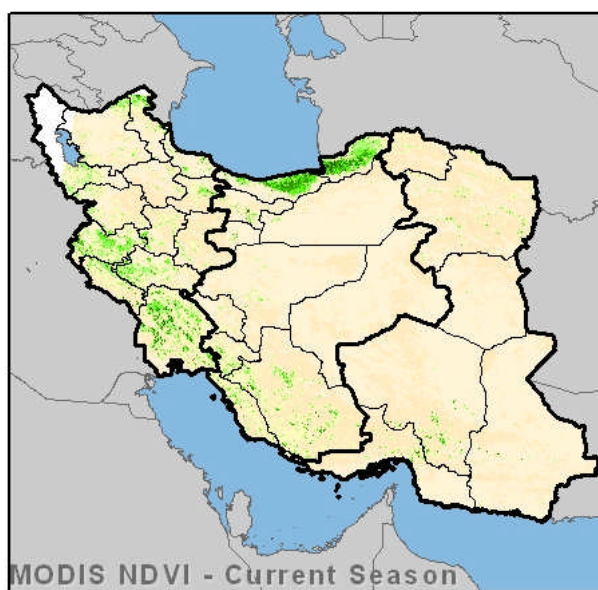
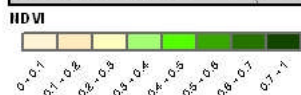
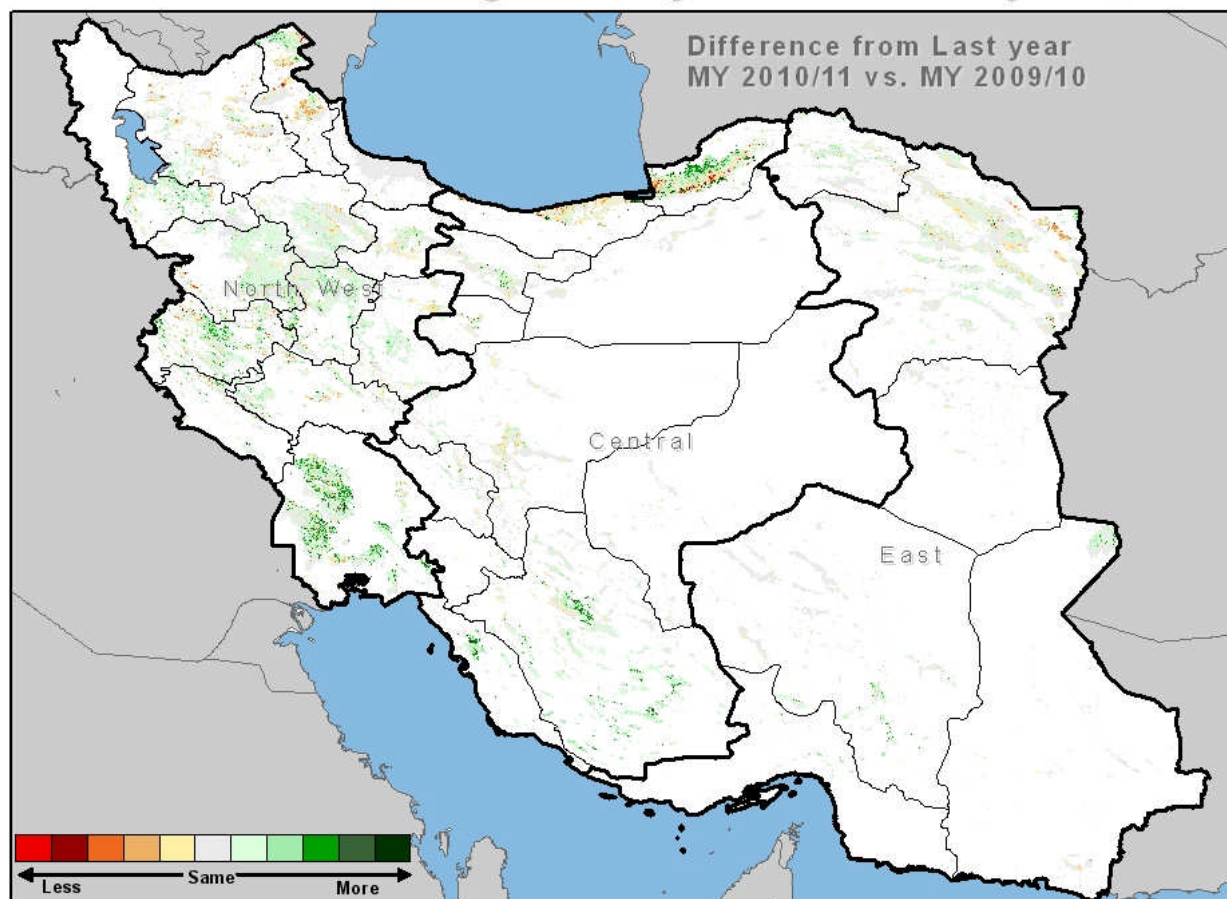
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Figure 8. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous 6-year average.

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## MODIS NDVI Change Analysis: February 17, 2010



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USDA-FAS, Office of Global Analysis, IPAD  
Crop Explorer





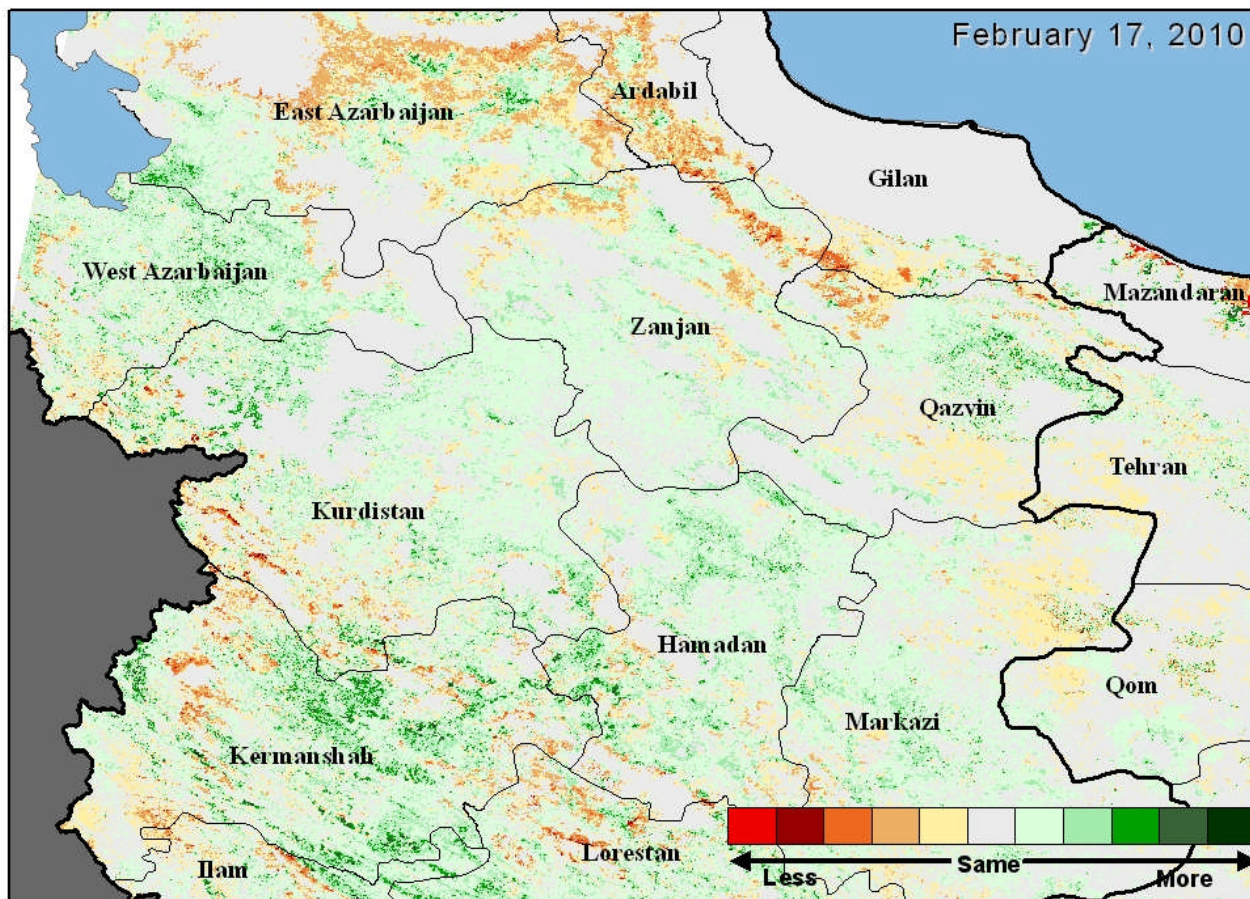
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Figure 9. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous year (MY 2009/10).

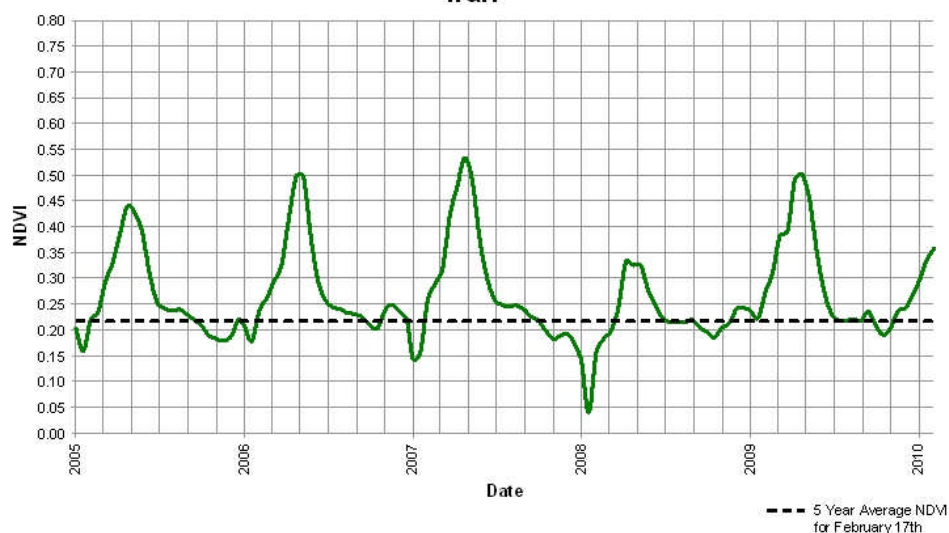
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## MODIS NDVI Change: MY 2010/11 vs. MY 2009/10



Winter Grain NDVI Time Series: Northwest Provinces, Iran



Data Source: MODIS 250m NDVI  
 USDA-FAS, Office of Global Analysis

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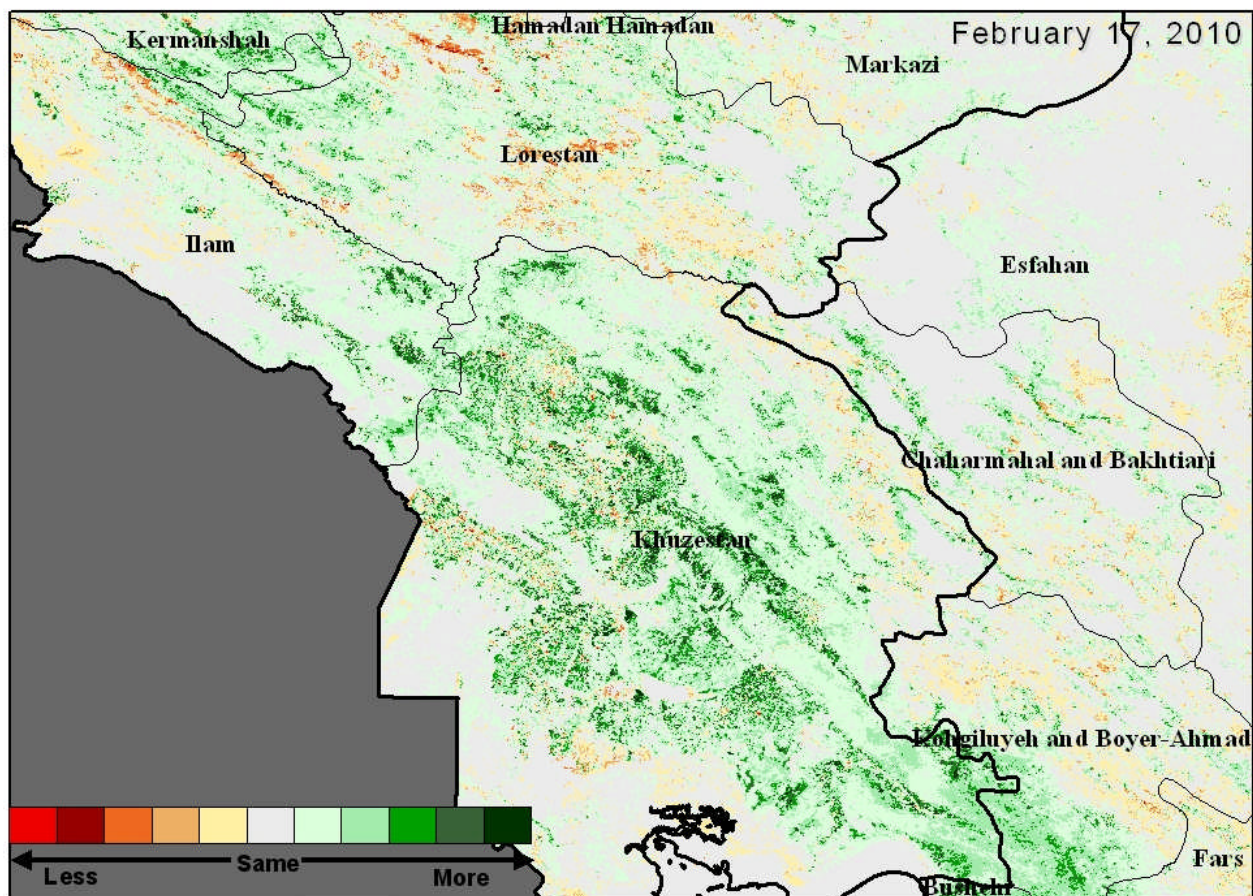
Figure 10. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous year (MY 2009/10) over major grain production provinces in northwest Iran

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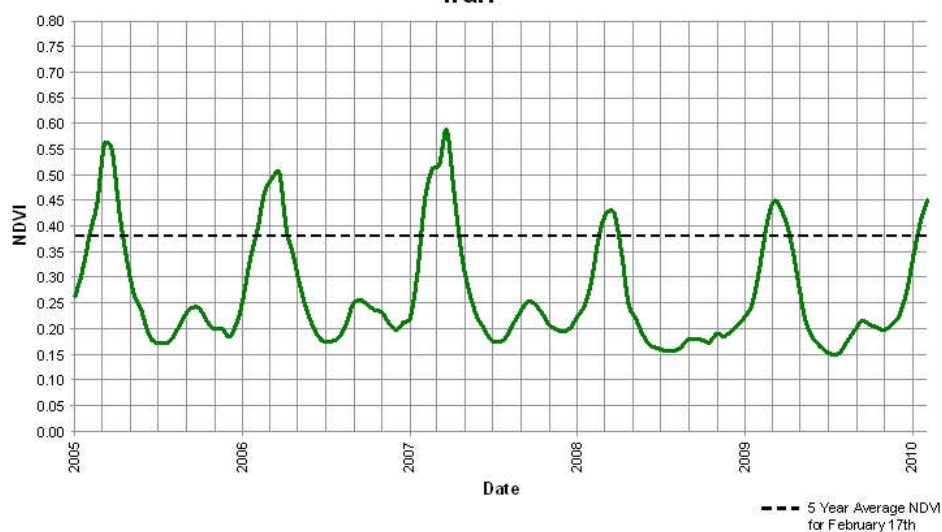


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## MODIS NDVI Change: MY 2010/11 vs. MY 2009/10



Winter Grain NDVI Time Series: Southwest Provinces, Iran



Data Source: MODIS 250m NDVI  
 USDA-FAS, Office of Global Analysis

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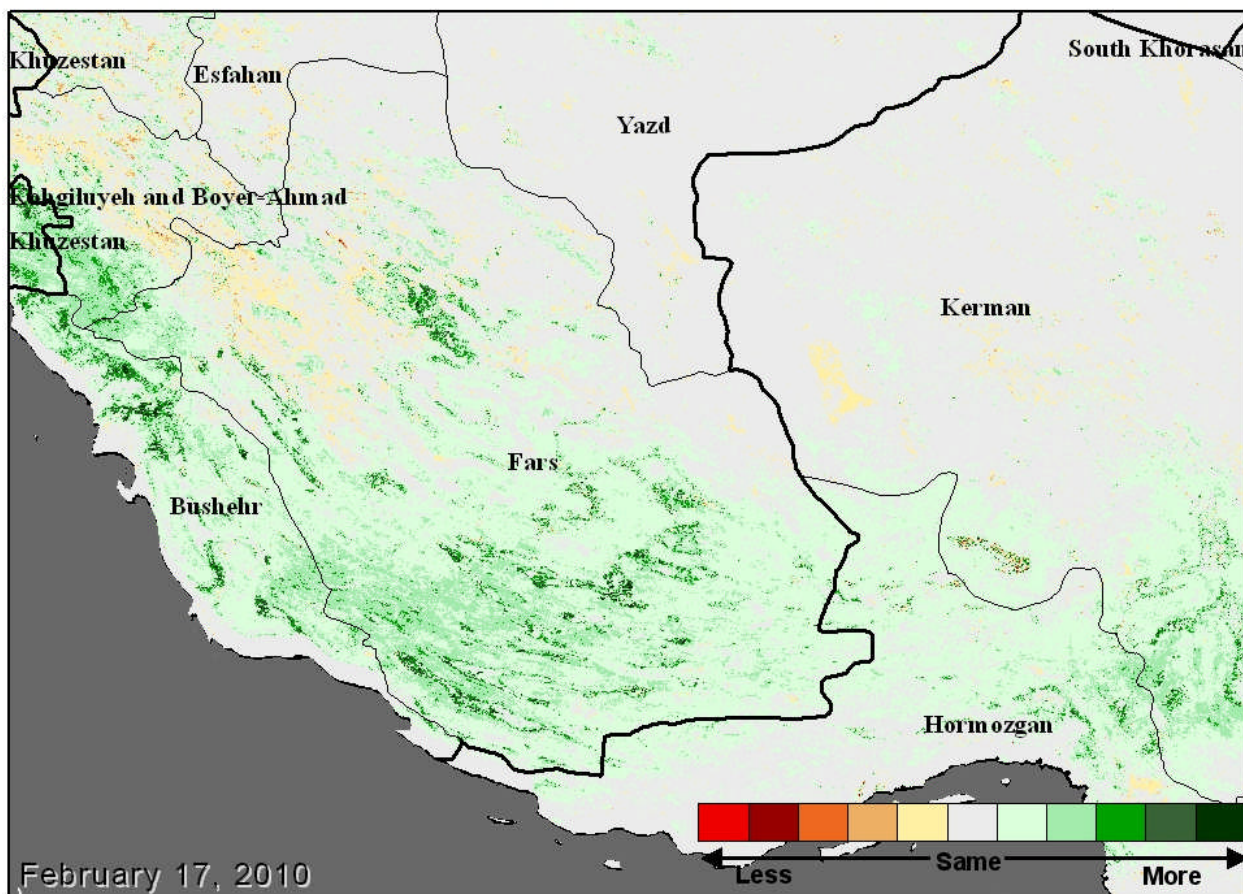
Figure 11. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous year (MY 2009/10) over major grain production provinces in west and southwest Iran, including Ilam, Lorestan, Khuzestan and Chaharmahal and Bakhtiari.

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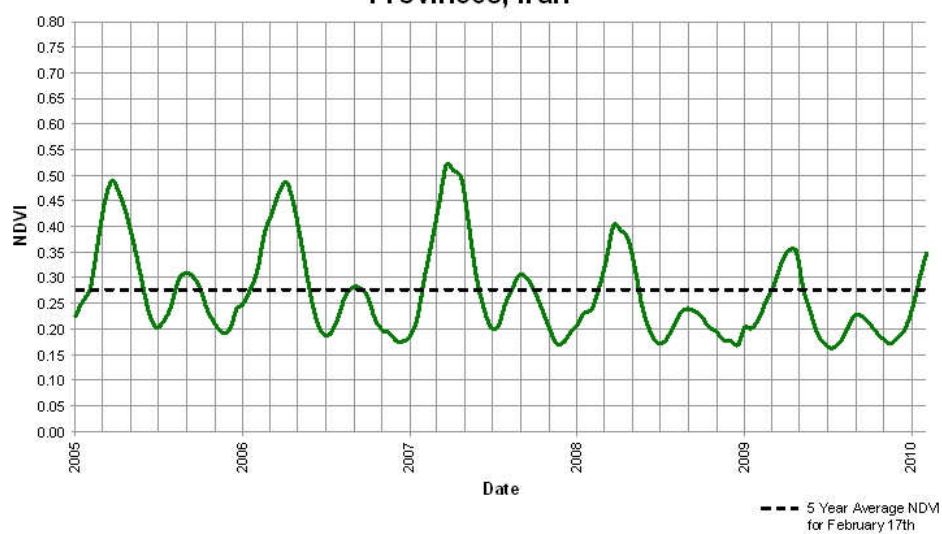


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## MODIS NDVI Change: MY 2010/11 vs. MY 2009/10



Winter Grain NDVI Time Series: South Central Provinces, Iran



Data Source: MODIS 250m NDVI  
 USDA-FAS, Office of Global Analysis



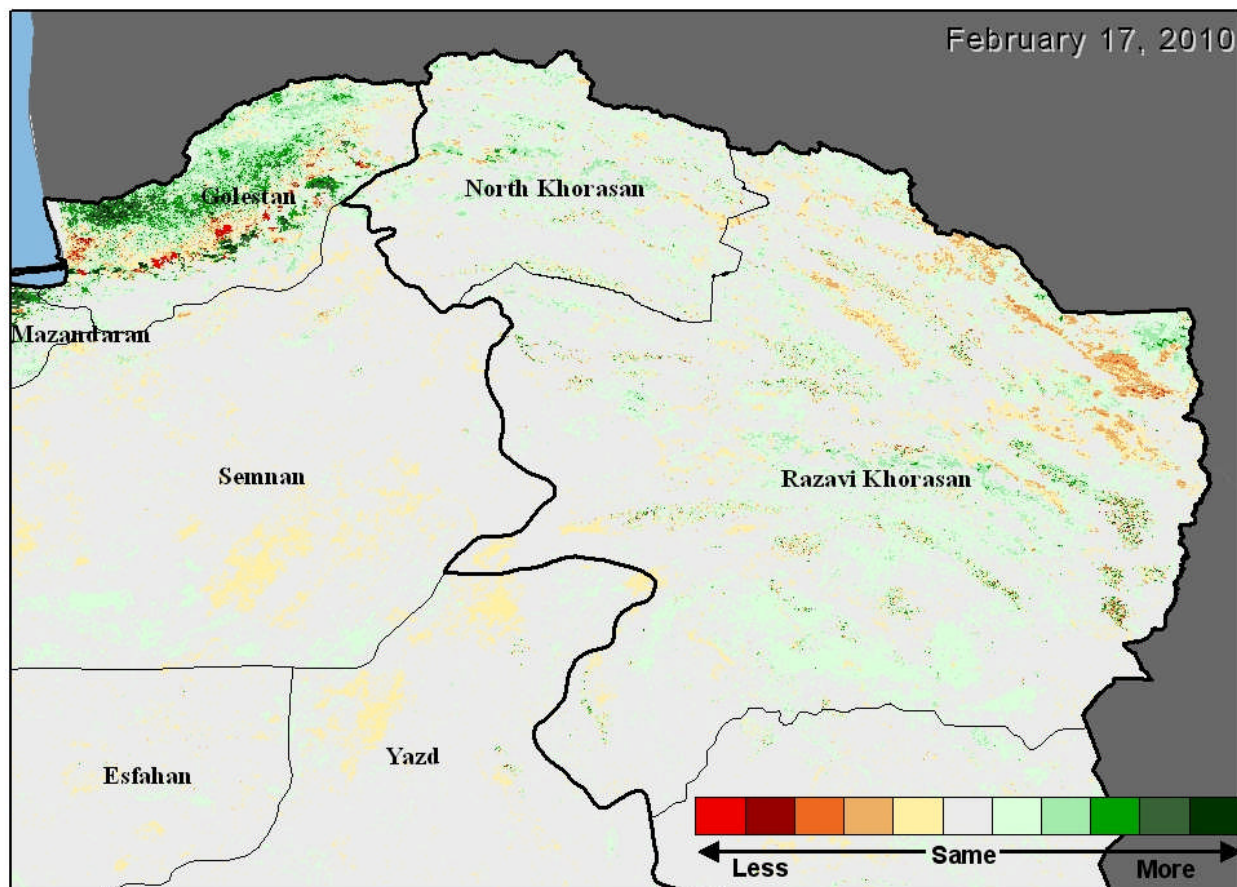
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Figure 12. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous year (MY 2009/10) over major grain production provinces in south-central Iran, including Fars, Bushehr, Kerman and Hormozgan.

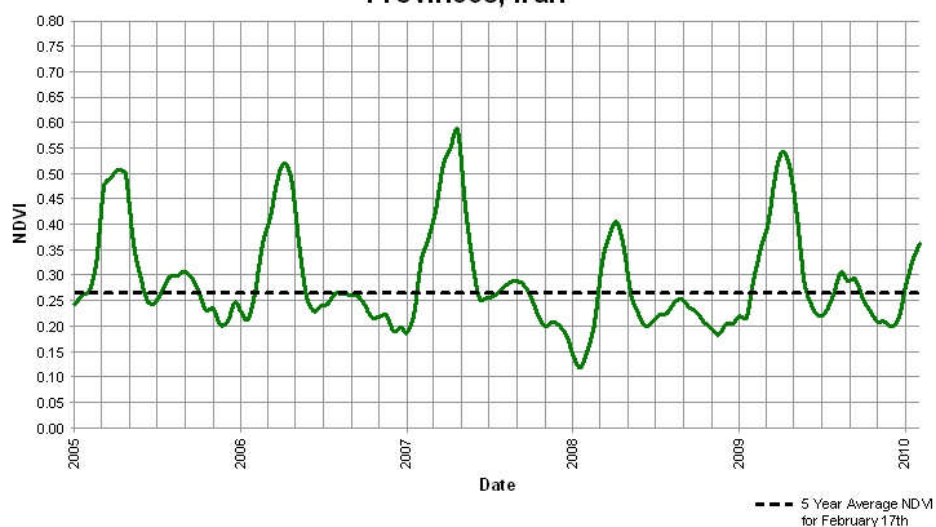
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## MODIS NDVI Change: MY 2010/11 vs. MY 2009/10



Winter Grain NDVI Time Series: Golestan and Khorasan Provinces, Iran



Data Source: MODIS 250m NDVI  
USDA-FAS, Office of Global Analysis

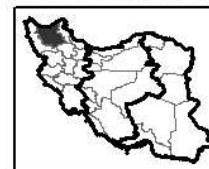
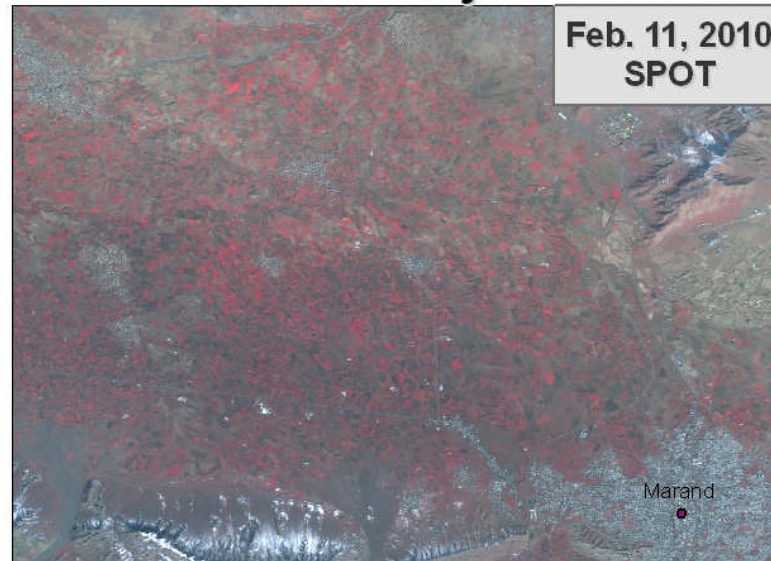
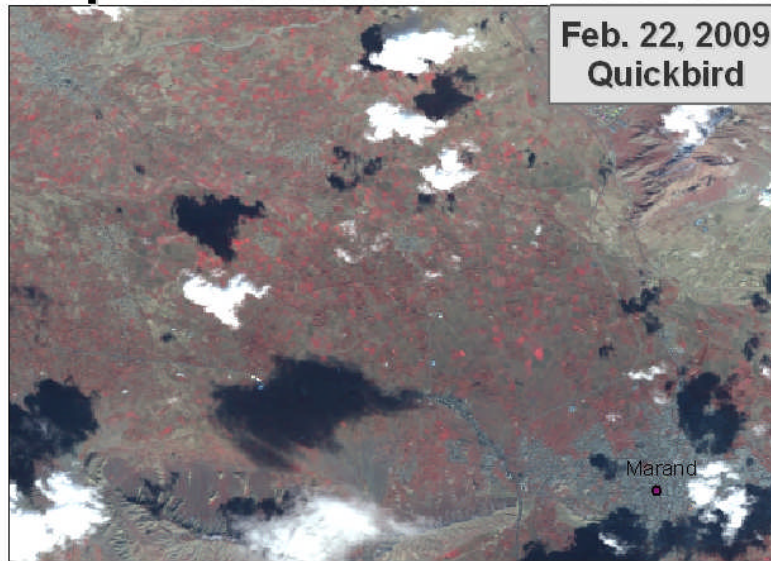
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Figure 13. MODIS NDVI change comparing current MY 2010/11 NDVI against the previous year (MY 2009/10) over major grain production provinces in northeast Iran, including Golestan, North Khorasan and Razavi Khorasan.

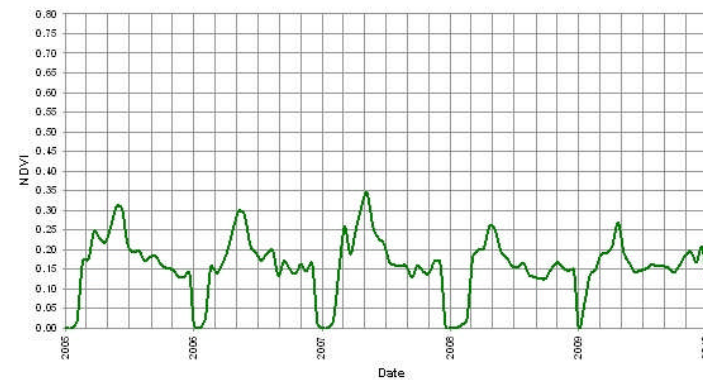
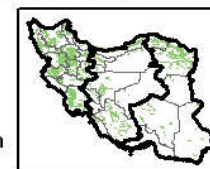
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## Crop Production near Marand, Iran - East Azarbijan Province



NDVI Time Series: Marand, Iran



Data Source: Quickbird; SPOT  
Data Provided by: NGA  
USDA/FAS/Office of Global Analysis

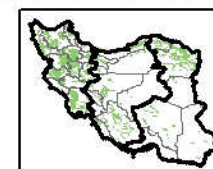
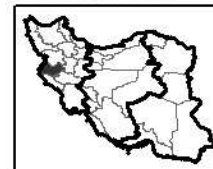
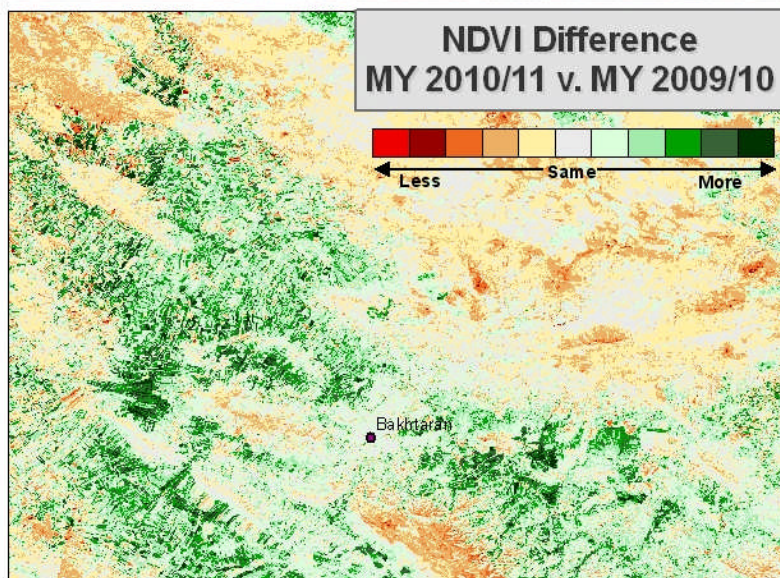
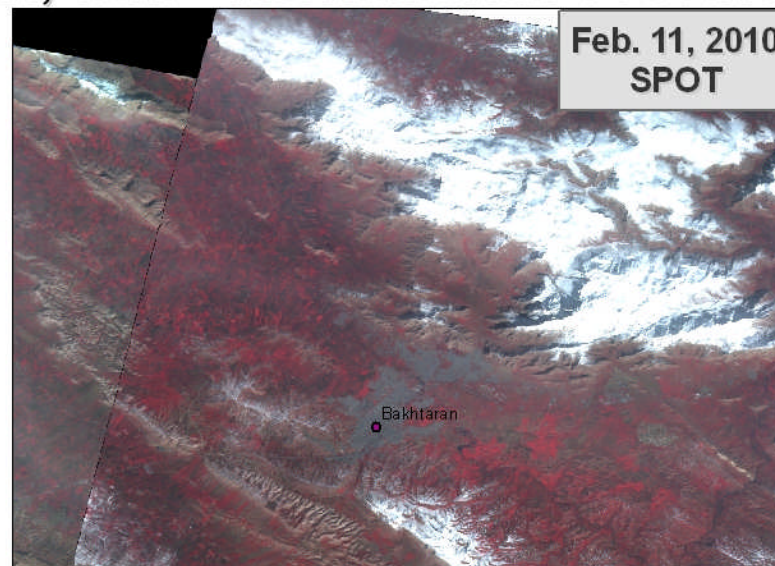
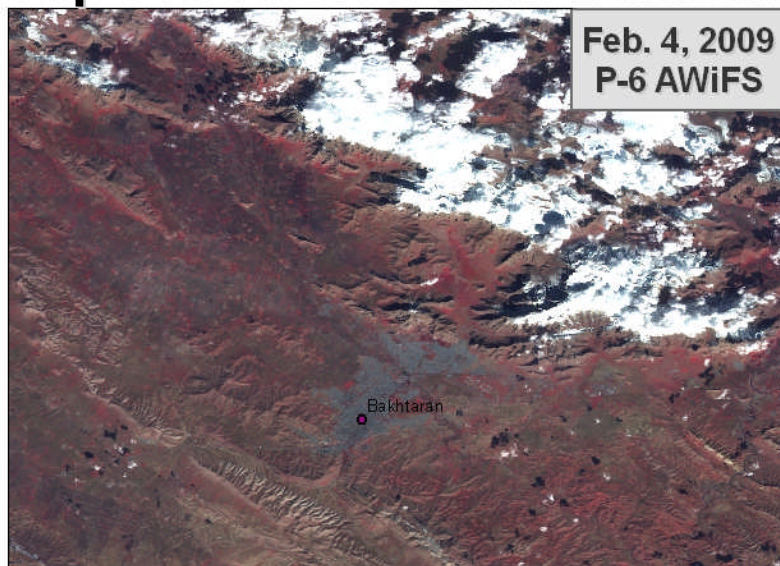
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Figure 14. Comparison of winter crop production near Marand, Iran, East Azerbaijan Province, Quickbird imagery from February 2009 (MY 2009/10) and current outlook SPOT from February 2010 (MY 2010/11). Agricultural fields in the region are primarily irrigated and used for both winter and summer crop production.

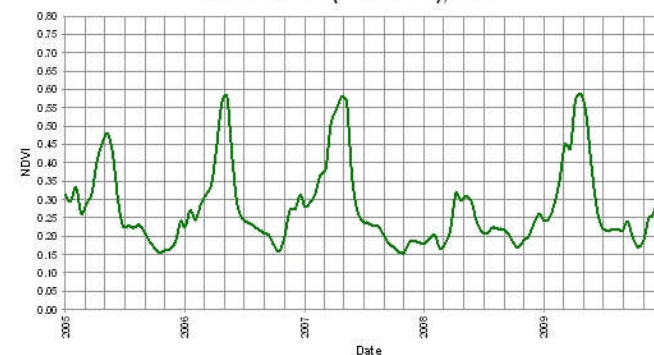
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## Crop Production near Bakhtaran, Iran - Kermanshah Province



NDVI Time Series:  
Kermanshah (Bakhtaran), Iran



Data Source: P-6 AWiFS; SPOT  
Data Provided by: NGA  
USDA/FAS/Office of Global Analysis

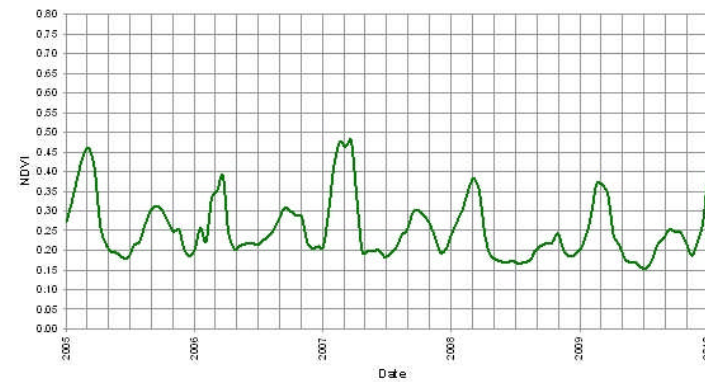
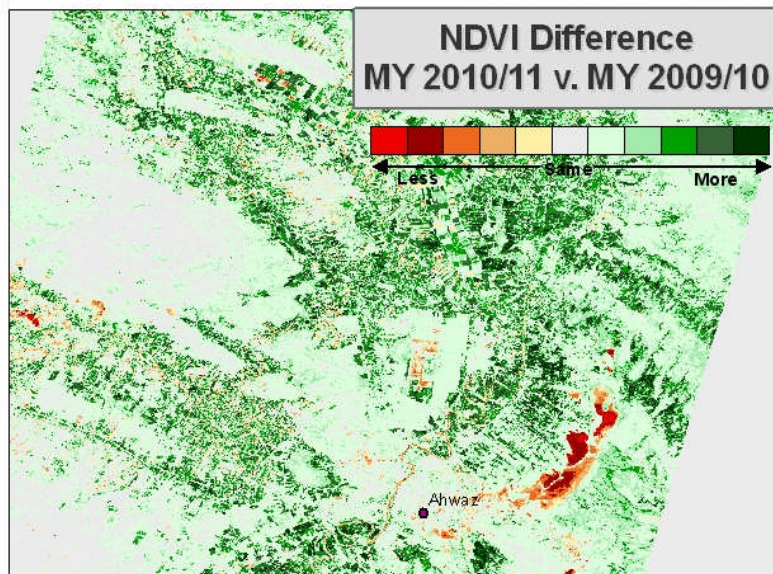
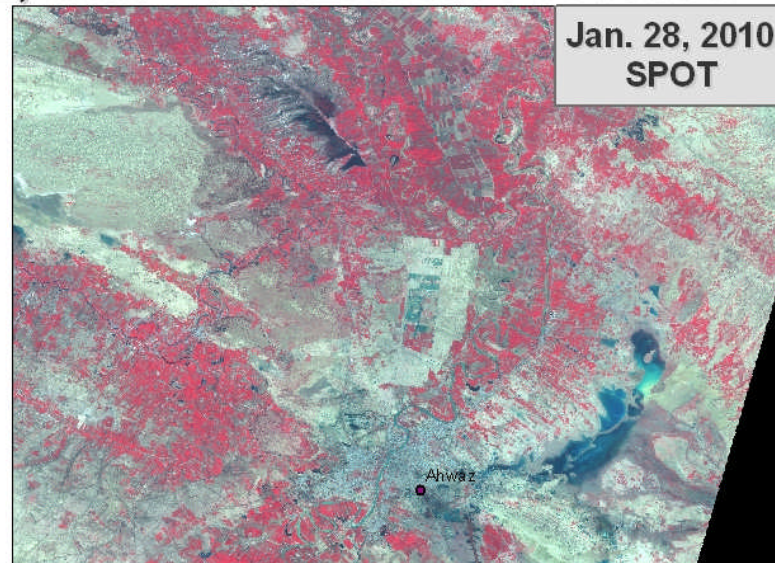
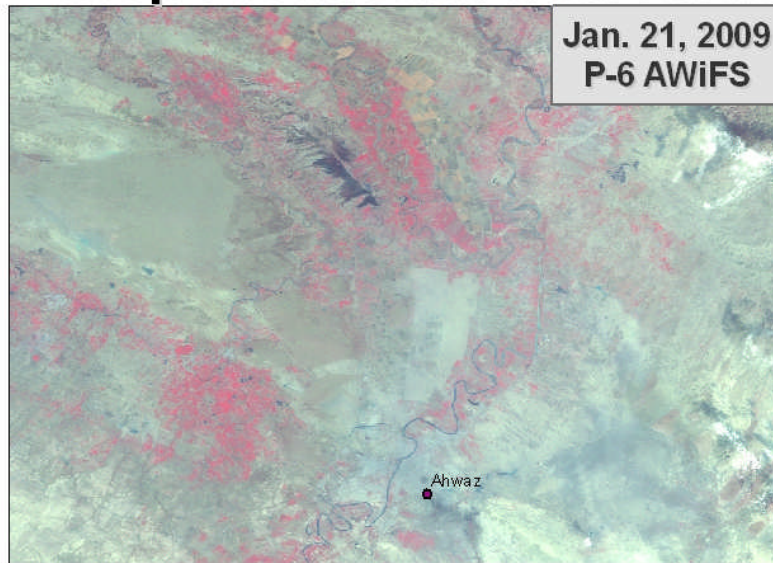


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Figure 15. Comparison of winter crop production near Kermanshah (Bakhtaran), Iran, Kermanshah Province. February 2009 AWiFS compared against February 2010 SPOT. Northwest rainfed provinces are seeing increased NDVI from previous seasons due to a shorter than normal winter dormancy, planted area appears normal.

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## Crop Production near Ahwaz, Iran - Khuzestan Province



Data Source:  
Data Provided by:  
USDA/FAS/Office of Global Analysis

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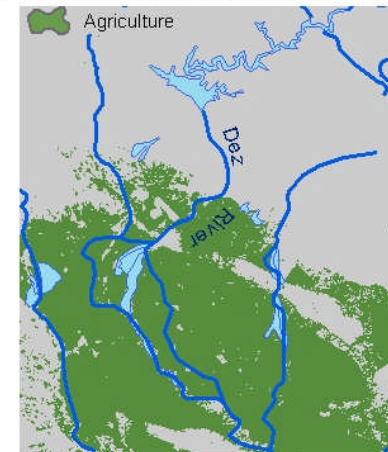
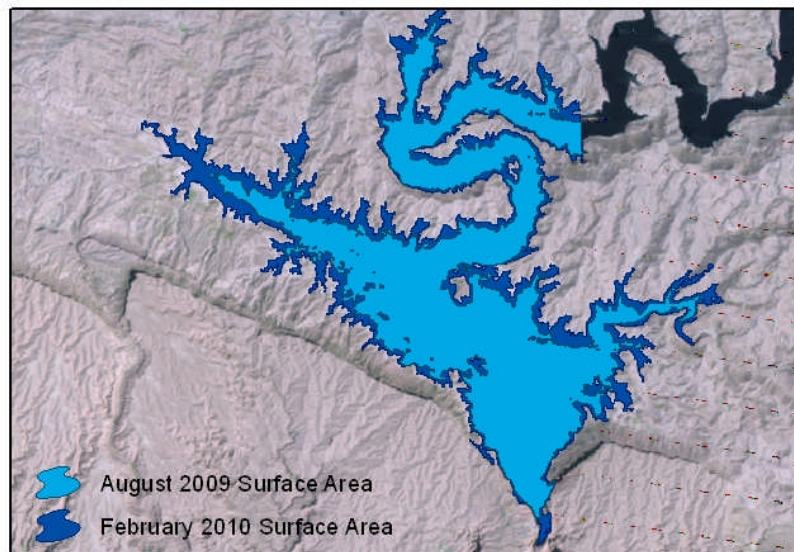
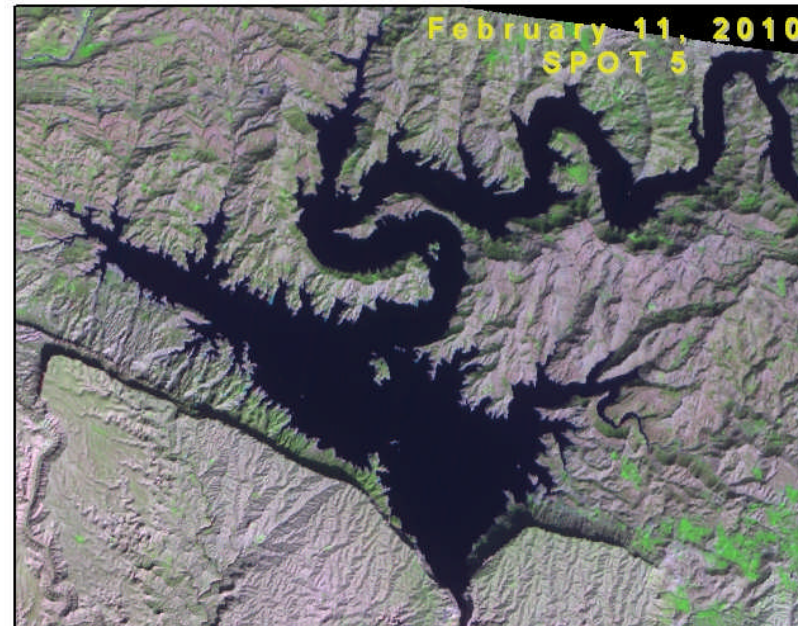
Figure 16. Comparison of winter crop production near Ahwaz, Iran, Khuzestan Province. Late-January 2009 AWiFS compared against late-January 2010 SPOT. Khuzestan winter grains production has seen a marked increase in planted area and NDVI over the previous two drought seasons; a return to levels similar to the 2007 benchmark.

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## Dez River Reservoir - Khuzestan, Iran



Data Source: Landsat ETM+  
USGS EROS Data Center  
USDA-FAS, Office of Global Analysis



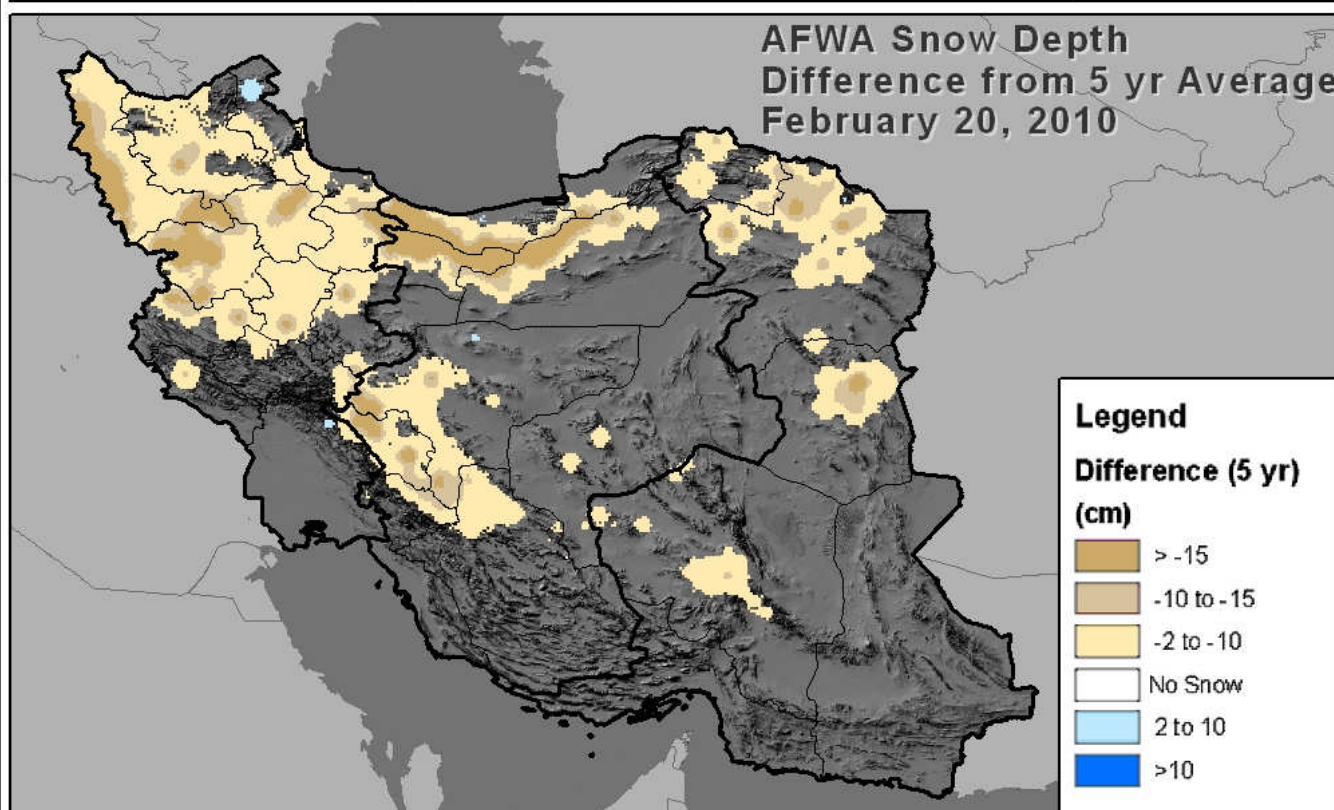
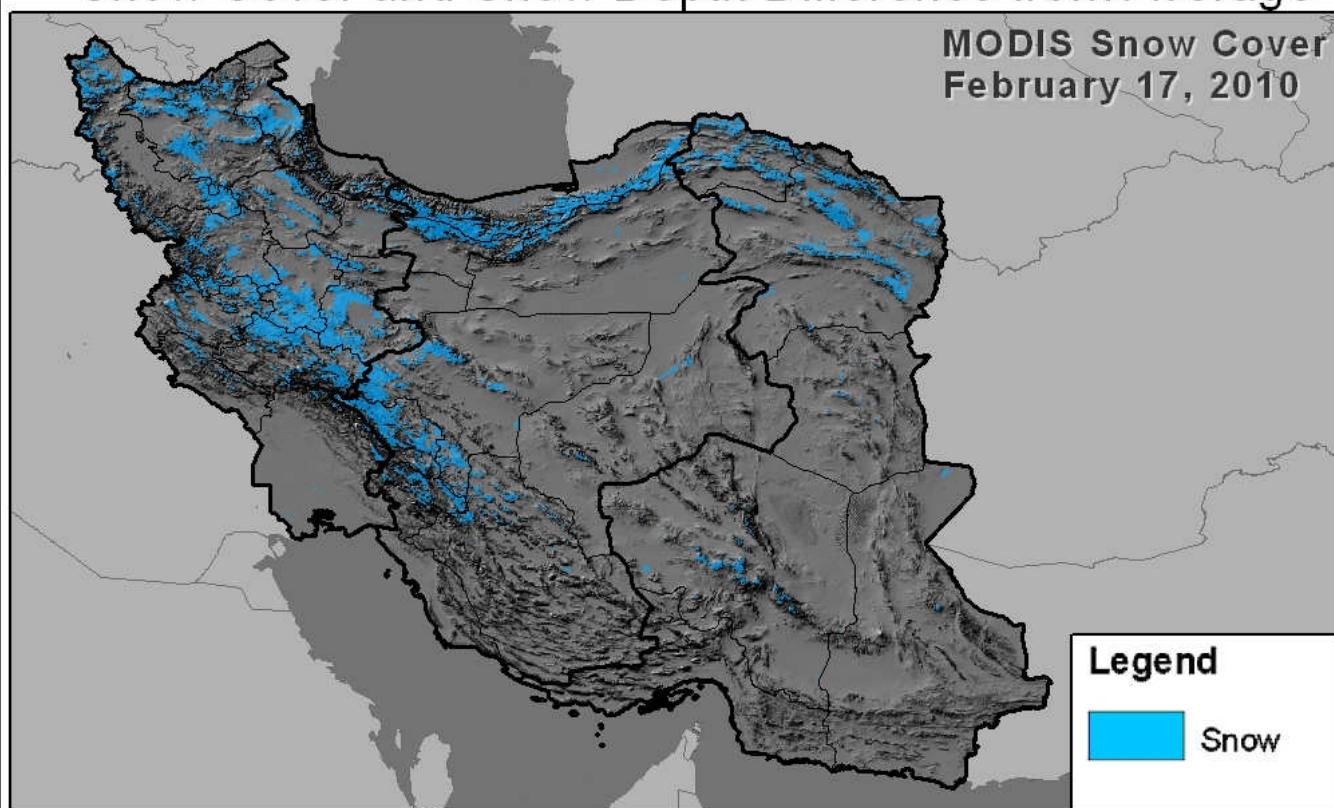
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Figure 17. Dez Reservoir/ River, an important source of surface water irrigation in Khuzestan Province and a tributary to the Karun River. Rainfall during September 2009 through January 2010 has helped to replenish water supplies which were low after two years of drought – 2008 and 2009. Showing a 41% increase in surface area.

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## Snow Cover and Snow Depth Difference from Average



Data Source: MODIS Snow Cover - AFWA Snow Depth  
Data Provided by: NASA - AFWA  
Supporting: USDA/FAS/OGA/IPAD

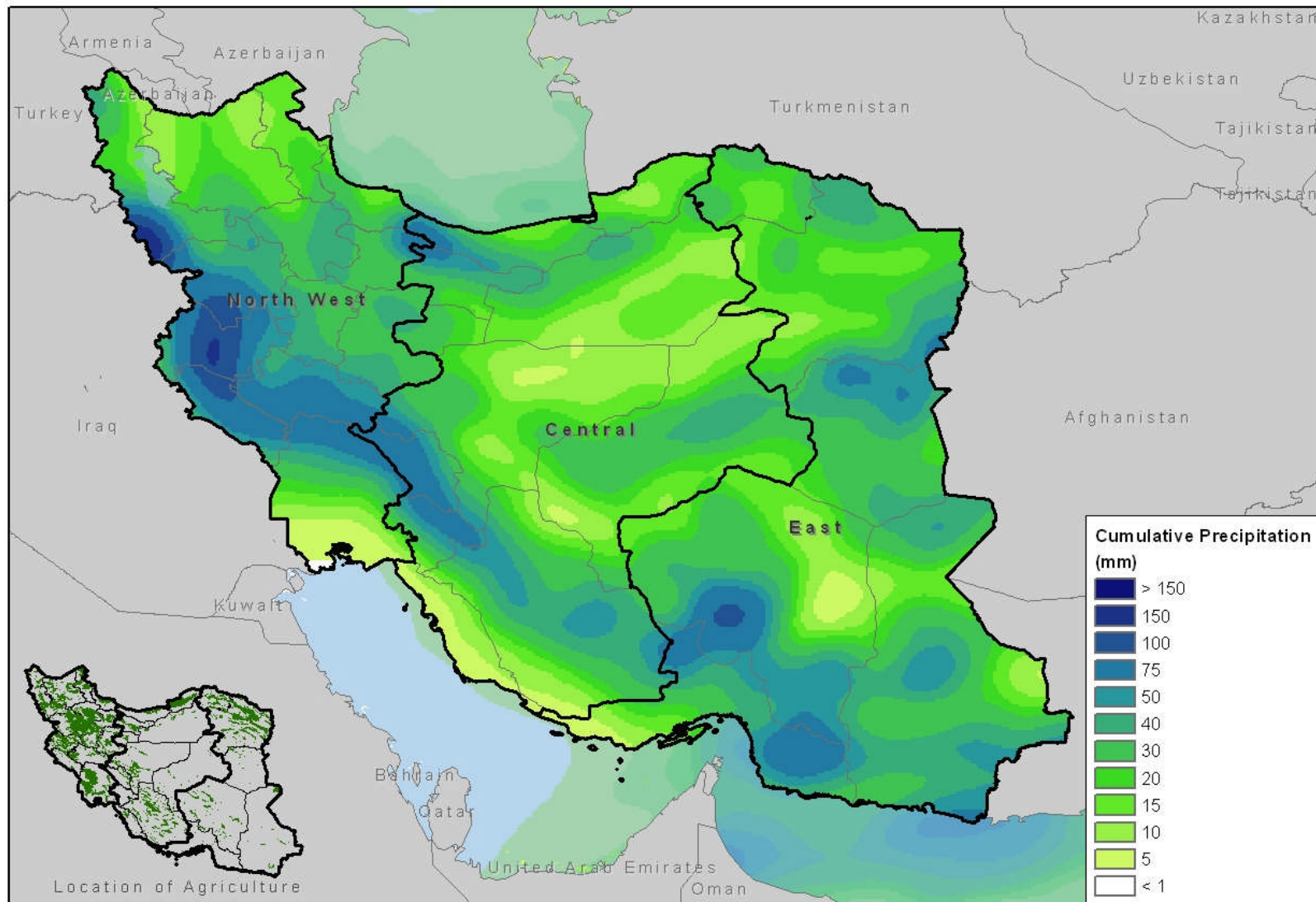
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Figure 18. MODIS snow cover and AFWA snow depth comparison to the 5 year average.

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## 7-Day Precipitation Outlook: February 25 - March 4, 2010



Data Source: NOAA Global Forecast System (GFS)  
Data Provided by: NOAA CPC  
Supporting: USDA/FAS/OGA/IPAD



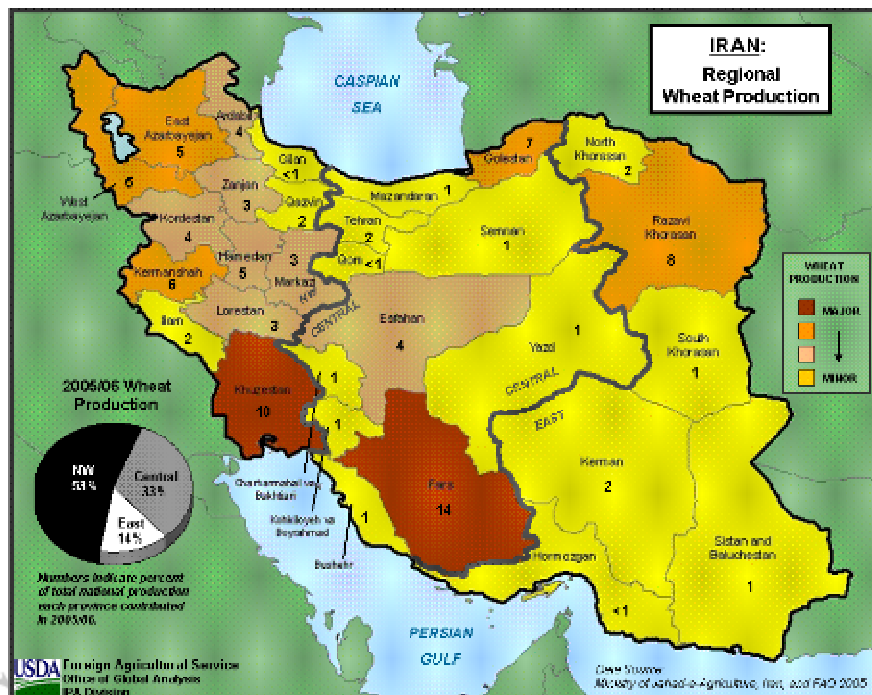


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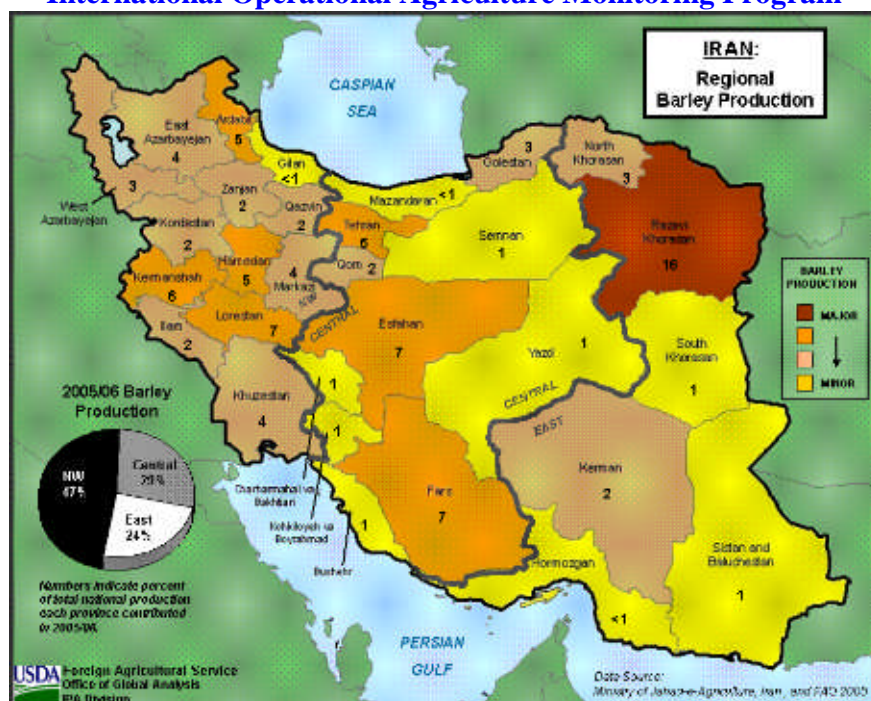
Figure 19. NOAA Climate Prediction Center 7-day precipitation forecast.

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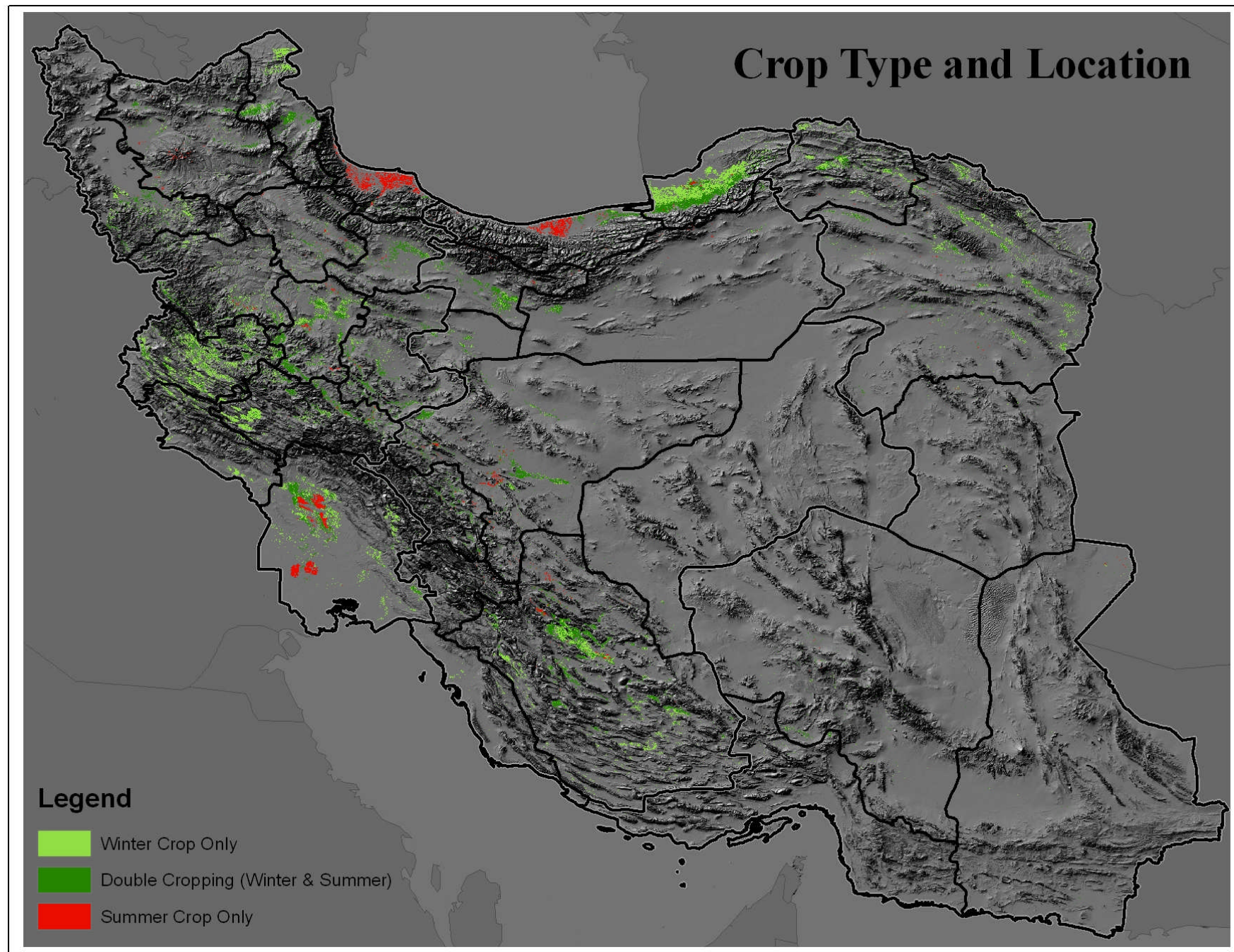
## Appendix.



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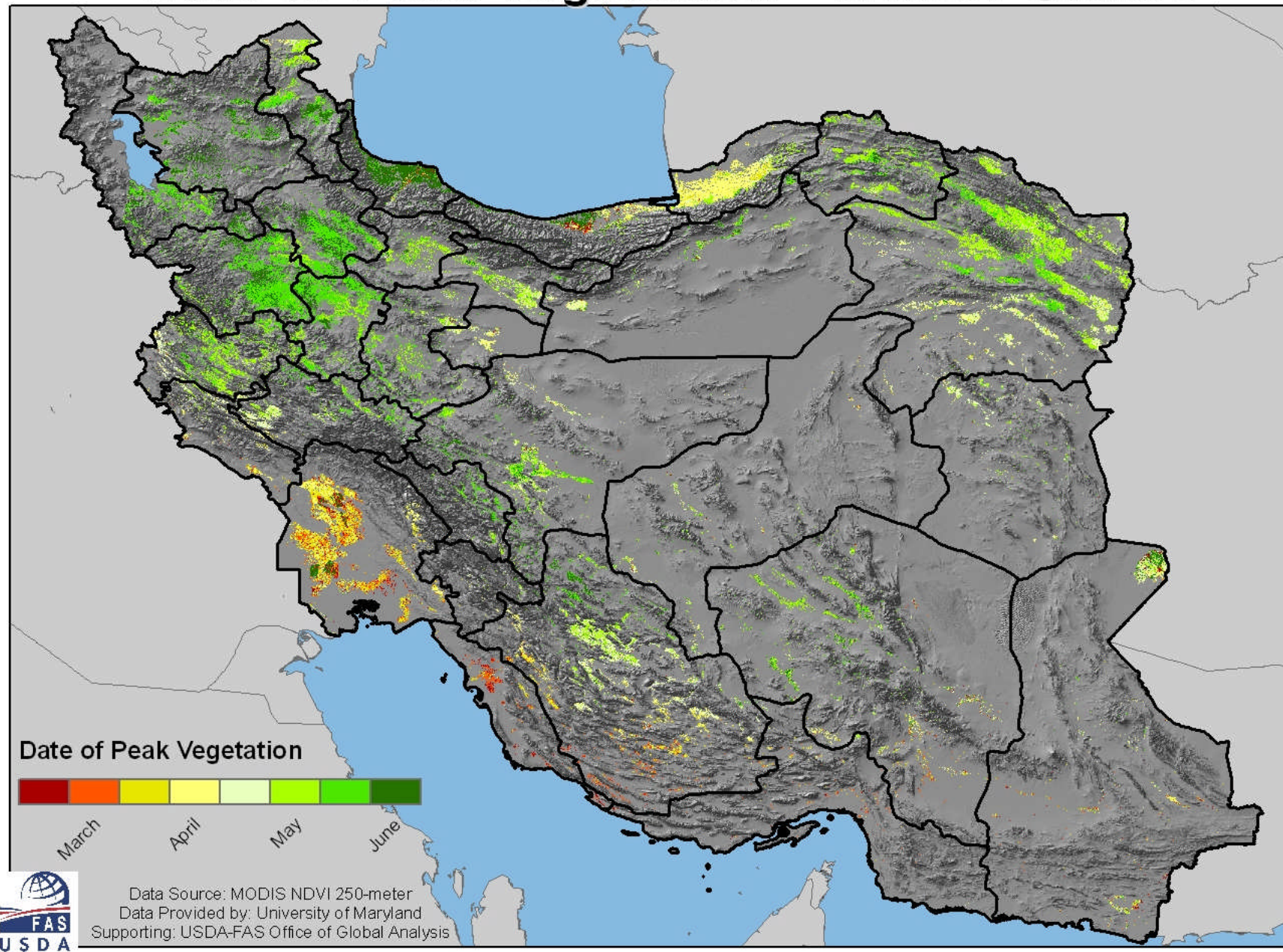




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## Date of Peak Vegetation - Winter Grains



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